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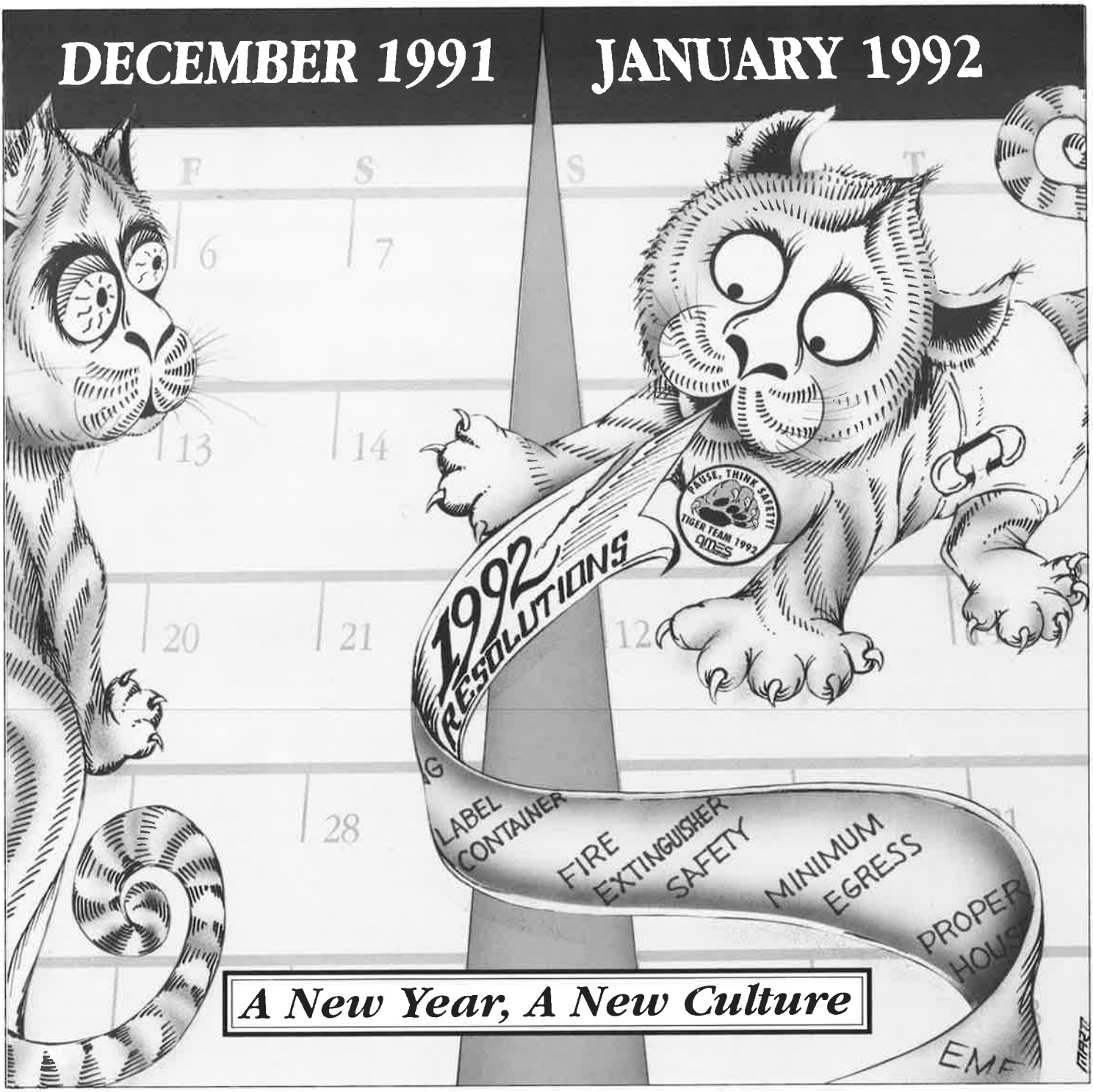
INSIDER

Newsletter for the Employees of Ames Laboratory ■ Volume 3, Number 1 ■ January 1992



Giving Some Sound Advice

Structural Engineers Provide Expertise to Improve Integrity of Nuclear Power Plant Containment Vessels

A team of engineers from Ames Lab's Engineering Services group and the ISU Civil and Construction Engineering department is helping the Nuclear Regulatory Commission (NRC) assess and improve reliability of nuclear power plant containment vessels through a Work-for-Others (WFO) federal agencies project.

Key members of the engineering team investigating containment vessel reliability for the NRC are Del Bluhm, senior engineer and manager of Engineering Services, Lowell Greimann, Lab associate and chair of the Civil and Construction Engineering department and Fouad Fanous, Lab associate and associate professor for Civil and Construction Engineering. Two graduate students, Rama Challa and Sanjeev Gupta, also contribute to the investigative efforts.

Ames Lab's involvement with the NRC began in 1979 with a study of the effects of internal overpressure on steel containments in response to the Three Mile Island accident. "Because of the pattern of excellence established in a number of projects related to performance of containment vessels in severe accidents, Ames Lab is now recognized as an expert by the NRC in problems involving overpressure and earthquakes," says Bluhm, NRC project manager for Ames Lab. "A direct result of this expertise is the more than $1 million brought into the Lab from NRC work. We now provide consultant services to the NRC for approximately $100 to $200 thousand per year," he adds.

The containment vessel of a nuclear power plant is a thin, cylindrical or spherical steel shell, housed inside a concrete building. The containment vessel is about 150 feet high and almost as wide. Within the containment building is the reactor vessel where the nuclear reaction takes place. To guard against release of radioactivity from the reactor vessel, it is essential that the steel containment structure be leak-tight.

There are some typical problems that can result from a severe accident, causing leakage and jeopardizing containment vessel safety. "Internal overpressure and seismic risk (earthquakes) can cause leakage," Greimann says. "The anchorage can fail, piping penetrations into the vessel can fail and the shell can buckle or tear," explains Fanous.

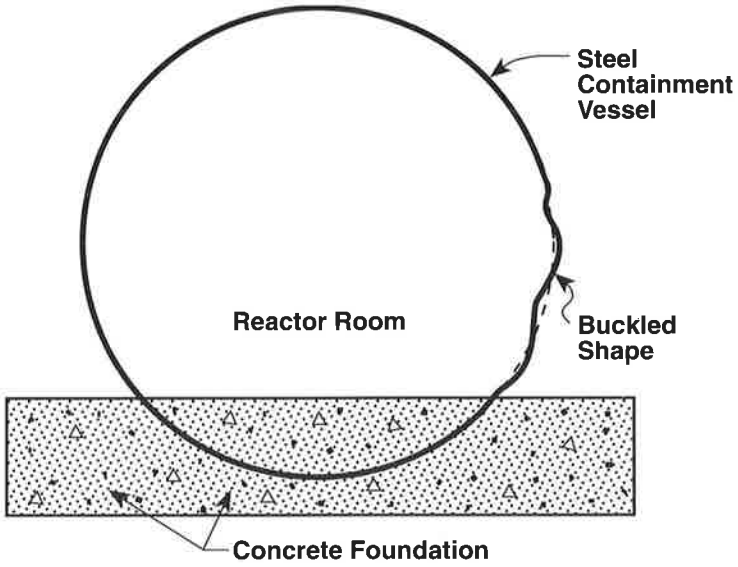
In a current NRC project, Greimann, Fanous and Challa are studying buckling of Advanced Light Water Reactor (ALWR) containments. "There is concern that these containments are more susceptible to buckling (see figure) since they are smooth shells and thinner with respect to the radius," states Greimann.

The Ames Lab researchers are reviewing two containment designs for new Advanced Light Water Reactor nuclear power plants. They will assess whether the designs will adequately guard against buckling of next generation ALWR containment shells. "The NRC wants to come up with a design that can be used throughout most of the country rather than the way it was done the first time around– every containment was unique, every one was specially designed," says Greimann.

Besides assessing designs for next generation ALWR containments, Greimann, Fanous and Challa will survey state-of-the-art software used in the analysis of thin shell steel containments, making recommendations to the NRC on the best software for analyzing buckling capacity. Once the software is selected, staff members from Ames Lab's Scientific Computer Services group will travel to NRC headquarters to load the complex computer code on NRC workstations, assuring proper operation of the analysis software. An additional task associated with the ALWR project will be a study to compare the theoretical and experimental buckling of thin shells.

In another NRC project, Greimann and Fanous had the opportunity to review buckling documentation for the San Onofre nuclear power plant in California. Plant owners analyzed the containment for buckling and submitted their analysis to the NRC. The Ames Lab researchers evaluated the analysis to determine if it was adequate. "Unlike the theoretical work for next generation ALWR containments, San Onofre represents work for an operating plant that had some

NRC/*Continued on next page.*



Typical buckled shape of a spherical nuclear containment after an event such as an earthquake.

On the team to improve reliability of nuclear power plant containment vessels for the NRC are, clockwise from upper left: Lowell Greimann, Rama Challa, Delwyn Bluhm, Fouad Fanous and Sanjeev Gupta.

Dedication of New Computing Lab Marks Partnership to Enhance Education

On December 3, an unusual computer ribbon-cutting highlighted the dedication of the new Instructional Computing Lab (ICL), a joint project of the Ames Lab Applied Mathematical Sciences (AMS) program and the ISU College of Education to advance the use of computers in education.

Located at N055 Lagomarcino Hall on the ISU campus, the ICL houses 15 Macintosh IIsi student terminals and one instructor's terminal. The multipurpose computer lab supports an array of software tools and applications and links users to local and global computer networks.

ISU Interim Provost Patricia Swan, and Gary Johnson of the DOE's Scientific Computing Office in Washington, D.C. officially opened the new ICL, jointly "cutting" a red and gold ribbon via computer.

The College of Education is already employing ICL facilities to enhance courses on using computers in the classroom, preparing tomorrow's teachers to use the latest educational computing technology.

Ames Lab's AMS program will use the ICL to train public school teachers to access supercomputers at national laboratories free of charge and how to use supercomputers to make math and science more exciting.

"The ICL represents a major and innovative way both the College of Education and Ames Lab are extending ISU expertise out into the state," says Swan. "Because Ames Lab is a part of the university, this type of collaboration between the college and a national research lab is easier at Iowa State University than elsewhere."

An outstanding example of Ames Lab/ISU resources in action, the ICL provides access to powerful equipment, offers hands-on opportunities for students and teachers to become familiar with computers and sparks interest in classroom computer applications.

Gary Johnson of the DOE's Scientific Computing Office in Washington, D.C. and ISU Interim Provost Patricia Swan prepare to push the button that sets a computer ribbon-cutting program into motion, opening the new Instructional Computing Lab (ICL) for Ames Laboratory and the ISU College of Education.

"The establishment of the Instructional Computing Lab marks the beginning of a long-term, durable and very exciting relationship between the Ames Lab AMS program and the College of Education," states James Corones, AMS program director. ■

NRC/*Continued from page 4.*

questions raised about it," explains Greimann. Bluhm adds, "Where some of our work is more research-related, San Onofre represents an area where we applied some of our expertise to an actual situation, not a theoretical plant."

Opening new avenues of expertise, the Lab recently began a project to demonstrate its capability in Probabilistic Risk Assessment (PRA) to the Nuclear Regulatory Commission. PRA is a complete assessment of the risk to the public from an accident in a nuclear power plant.

"Probabilistic Risk Assessment is a recognition that accidents have a probability of occurrence," says Greimann. "Getting engineers and eventually the public to think not just in terms of yes/no answers to safety questions takes an educational process. That's one of the bigger aspects of PRA –it motivates us to think about what we are willing to live with in terms of accident probabilities," he says.

"Our goal is to show the NRC that Ames Lab is capable of doing probabilistic risk assessment," says Greimann. To establish credibility with the NRC, Greimann, Fanous and Gupta plan to perform a demonstration PRA project based on an extensive literature survey on PRAs that Gupta will complete.

Beginning in FY92, owners of about 113 nuclear power plants will be required to submit PRAs to the Nuclear Regulatory Commission for evaluation. Once credibility is established, Ames Lab could assist the NRC in evaluating these PRAs.

Besides the obvious benefits of determining reliability of nuclear power plant containment vessels, Ames Lab's NRC work helps support graduate students and provides them a tremendous opportunity to learn. "In Civil and Construction Engineering, almost all of our job is education; the NRC work helps us do that," says Greimann. "It gives us real-world examples we can talk about in the classroom." Supporting this view, Challa adds, "It provides a good chance to work in areas not normally encountered in a classroom situation."

"Ames Lab can be proud of its 12-year commitment to containment vessel integrity through excellence in design and fabrication for our nation's nuclear power industry," summarizes Bluhm. "Also, NRC projects involving nuclear power plants have very firm time constraints which we have met." Greimann adds, "Plant owners are anxious to get licensed by the NRC, and that takes many steps. We're one of those steps." With no pun intended, Fanous concludes, "It teaches us how to work under pressure." ■

Frustration

I hear it in your voices, I read it in your memos and I very definitely feel it in myself day and night.

Frustration: The Tiger Team is coming and we are not yet ready. **Frustration:** They told us to get our MSDS system in order and now they tell us all our sheets are invalid. **Frustration:** They want us to shut our instruments down for safety remediation. They just don't understand how important this next experiment is to us. **Frustration:** I've been doing it this way for 25 years without any problems and now they want me to change. This will cost me valuable research time. **Frustration:** Less than two months before our Tiger Team visitation, ES&H pre-assessment teams descend upon us en masse and make it difficult to accomplish our essential remediation and documentation. **Frustration:** The scientists want to argue with our pre-assessment findings rather than simply correcting them. **Frustration:** I'm taking my frustrations home at night and venting them on an undeserving and unreceptive audience, etc., etc., etc.

While it doesn't make it more palatable, all this was predictable.

"We are undergoing the difficult labor of the birthing of a cultural change which has exceeded its gestation period."

–Tom Barton

We are undergoing the difficult labor of the birthing of a cultural change which has exceeded its gestation period. Thus, it is a time that requires the difficult combination of exhausting effort, breaking long-ingrained habits and almost infinite patience. I have been trying to understand why it is so difficult for us to identify root causes, and I think I have a handle on some of it. Scientists have trained to almost instinctively distrust new data and, if a new regulation is imposed, their immediate inclination is to question it. I both understand and empathize with this, but it is unacceptable behavior at this time. We simply must face the fact that Ames Lab is going to be operated in a manner totally in compliance with all applicable ES&H regulations, or it will cease to operate. So let's catch our second wind, reaffirm that this must be a total team effort, show a little patience for each other's frustrations and get the job done. I am more convinced every day that Ames Lab is going to be both a safer and more efficient place to work once this new culture is firmly in place.

— Tom Barton

ALTRS–It Will Change the Way You Look at Safety

New Computer System to Enhance Safety Management

Hugh Hammond, safety training coordinator, and Connie Vaclav, programmer analyst, are working on a new computer system to track safety training and certification at Ames Lab.

Currently in the development stage, the Ames Lab Computerized Safety Training Records System (ALTRS) will also print quality control reports and provide other statistical data such as the cost per person for safety training and the number of training hours per year per employee. "ALTRS will also allow for electronic mail communication between the ES&H Group and safety coordinators," notes Hammond.

While planning ALTRS, Hammond contacted Elizabeth Carroll, program director for technology integration at Oak Ridge Associated Universities, to evaluate their computerized records systems. Based on some of the Oak Ridge information, Hammond and Vaclav collaborated to create a system that will best meet Ames Lab's needs. "Ames Lab appears to be the first DOE facility to have a lab-wide computerized records system that will perform audits to determine completion of safety training and provide quality control to determine performance indicators," notes Carroll.

ALTRS will use the Hewlett Packard HP3000 mainframe and will be available to safety coordinators through either PCs or terminals. Safety coordinators will have the capability to input and review training information. "ALTRS will be very user-friendly, highly powerful and quite flexible when it comes on-line," says Vaclav.

"ALTRS is not just a quick fix for the Tiger Team visit, but a safety management tool that will help us perform our job in a better fashion for the immediate time and in the future," explains ES&H Manager Lowell Mathison. ■

Ames Lab is Number 31

Since June 1989, when Energy Secretary James Watkins ordered assessments of DOE facilities by special Tiger Teams as part of a 10-Point Plan aimed at strengthening environmental, health, safety and waste management programs within DOE, 30 sites have been completed.

Ames Lab is the 31st out of the total 36 facilities to be assessed. Assessments of all 36 sites are expected to be completed by June 1992.

Ames Lab's Tiger Team leader is Linda M. Smith, acting deputy director of the Nevada Field Office. At this time the only other known leader is Douglas Abramson, general engineer and team leader for the Technical Safety Assessment Division for the Office of Performance Assessment, Germantown, who will lead the safety and health sub-team.

The 40-person team will be at the Lab for four weeks beginning February 3. Fifteen members of the team will specialize in safety and health issues, 15 in environmental concerns and 10 in management. The close-out is scheduled for February 28.

A pre-assessment team comprised of 10 members of the Tiger Team will be here January 8 and 9 to survey the facility and confirm the agenda for the Tiger Team visit in February.

Find-A-Fault Contest

Here are the latest Find-a-Fault contest winners and their winning suggestions:

Ken Ewing, plant safety patrol officer:

Get proper NFPA signage put up in building lobbies and specific room areas. Remove inappropriate signs.

Paul Millis, health physics technician III, ES&H:

Produce a short course for all line management personnel on ES&H items.

William Martin, plant safety patrol officer:

Establish a period of "correction days" where personnel devote all effort to prepare for the Tiger Team inspection.

Chris Fullhart, graphic designer I:

Provide assistance in operator-aid signage design and help get signs produced and posted.

Jeff Jensen, student associate, Metallurgy and Ceramics:

Install telephones in building corridors with emergency numbers posted for assistance.

Marj Paradis, assistant budget officer:

Establish routine visits to Laboratory areas and acknowledge "best" groups in the INSIDER.

Gerald Flesch, associate chemist, Fundamental Interactions:

Periodically publish or post the list of recent accident or injury cases. Include table of "days since lost-time accident."

BULLETIN BOARD

MISS YOUR MANDATORY SAFETY TRAINING?

Two dates remain in January for employees to receive mandatory safety training required to meet OSHA rules and standards.

Wednesday, January 8	1:30	Condensed Matter Physics
	2:30	Condensed Matter Physics
Friday, January 10	9:15	Materials Chemistry
	10:15	Materials Chemistry

Any employee missing their program's previously scheduled training may attend one of the above sessions in the Spedding Hall auditorium. Attendance will be taken.

LAB IS A GIVING PLACE

Ames Lab won a merit award for its participation in the 1991 United Way Campaign. The Lab won in the Iowa State University division for having a 100 percent increase in giving from the past year.

CHECK IT OUT

Safety training is a major issue at Ames Laboratory, where an ES&H culture is evolving. To enhance safety training, ES&H has a number of job-related videos available for checkout. Because of demands on the ES&H group at this time, checkout will be handled by the Office of Information in 201 Spedding during January and February. You may call 4-9557 to check on availability of specific tapes. (Note: Office of Information staff will advise you about the location of an available TV and VCR at the time of checkout.)

Videos available (each approximately 20 minutes):

1. Keys to Lab Safety (This is an excellent video with safety information on working in labs.)
2. Handling Hazardous Chemicals (This video has general lab and chemical safety information.)
3. Laser Safety
4. Lab Hood Safety
5. Labels on Chemicals
6. Ionized Radiation
7. Materials Safety Data Sheets
8. Forklifts

COMPANY'S COMING

The 40-member Tiger Team will be at Ames Laboratory from February 3 through February 28.

STOREROOM TO ISSUE LABORATORY RESEARCH NOTEBOOKS

Effective immediately, laboratory research notebooks will be issued through the Storeroom instead of the Office of Information. After you are issued a notebook, please write your name on the outside front, white label. Notebooks should be returned to the Office of Information, 201 Spedding.

If you need a logbook (used for various record-keeping functions such as equipment logs, purchase order numbers, registered mail, etc.), ask for a logbook, not a notebook. Logbooks are now available that are different from research notebooks.

If you have any questions, please call Donna Millang, 4-1856.

☎ SAFETY HOTLINE

You are encouraged to report safety infractions and concerns. Please call the Office of Information, 4-1856. Calls will be kept confidential.

Things Meant to Be

"I had a crush on him from the fourth grade on," says Brenda Smith about her husband Clare. "But it wasn't until our senior year in high school that I caught his interest. He was shy."

Smith, secretary in the Processes and Techniques and Materials Chemistry programs, grew up with her husband Clare in Innerkip, Ontario, Canada literally from the day she was born. "Our parents were friends," she explains. "When I was born four months after Clare, his parents sent my mom and dad a card of congratulations."

Smith and Clare went through grade school and junior and senior high school together, and also attended the same church. "We were in several church plays together," notes Smith. "Many times we both had lead parts, playing opposite one another."

Some things are meant to be. Smith and Clare married in 1971 and left Canada for the U. S. in 1974 when Clare came to ISU to get a Ph.D. in plant breeding.

Smith and her husband chose to keep their Canadian citizenship, but are permanent residents of the U.S. "We really like Ames," says Smith. "Innerkip has only 400 residents and two general stores."

Her husband is not the only thing that was meant to be in Smith's life. "I always wanted to be a secretary," says Smith, who has served Ames Lab in that capacity since 1974. Starting out part-time in the personnel office, she later transferred to a full-time secretarial position with Senior Chemist Robert Jacobson and Program Director James Espenson. Handing out a compliment to her longtime bosses, Smith states, "They are both very organized, easy to work with and probably the reason I've stayed at the Lab so long."

Smith enjoys her work and says, "I'm here to help others. If I

Brenda Smith

can do my job in a manner that communicates that idea, I'm happy."

Outside of the Lab, Smith contributes her professional skills to the local chapter of the American Business Women's Association (ABWA). During her eight-year membership, she has served as president, vice president, recording secretary and was elected woman of the year by her chapter in 1986. She currently serves as corresponding secretary for the organization.

Smith likes to swim, ice skate and read. She says she usually tries to swim two or three times a week during her lunch hour, and adds, "I don't ice skate very often now, but I used to play hockey a lot growing up in Canada." Smith says her favorite thing to do is curl up with a good book. She enjoys learning about real people, reading the autobiographies of Nancy Reagan, Barbara Mandrell and, of course, Wayne Gretzky, among others.

With a history of things meant to be, it appears there is yet one more thing Smith is destined for– world travel. Accompanying husband Clare on business trips to such places as France, Spain and Hawaii, Smith says she enjoys traveling and the chance to meet people from different parts of the world. A recent promotion for Clare will involve more frequent trips and the opportunity for Smith to make a return visit to France in the near future. ■

Unlocking the Riddle

Who has access to every room, cubbyhole and desk drawer in Ames Lab and listens to locks talk?

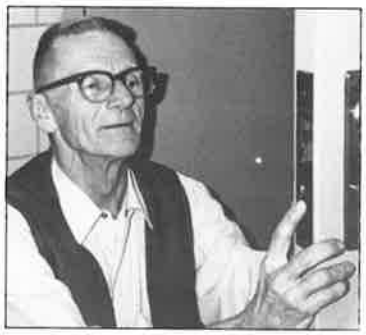
Darwin Riddle says it takes patience and luck to be a locksmith. The ability to listen helps too. "The locks talk to you," he says. "They do certain things when you make an impression, and they tell you where to go and what to do. Locks usually do predictable things."

Before beginning at Ames Lab two years ago, Riddle worked for 27 years in ISU's residence halls. "Since I've been at the Lab, I haven't found any doors lying in the hallway or any gum or glue," Riddle says. "Students do some crazy things. One of the worst experiences I had was one night in Maple Hall when some students super-glued 280 mailboxes shut. The mailboxes had to be removed and brought to the shop to get them open. Another time they airplane-glued 125 pipe chase locks shut so the plumbers couldn't get to the pipes. At Ames Lab, I see nothing like that," he says. "Responsible human beings work here."

Riddle cuts keys, repairs locks, installs hardware and provides keys from numerical codes. If there is no key, Riddle picks the lock and uses coding machines and bidding lists to get the numbers to make the key.

Besides working with Ames Lab's approximately 400 locks, he engraves plaques and nametags and helps the maintenance group move furniture and perform other miscellaneous tasks. During his two years at Ames Lab, Riddle has changed all the locks in Spedding Hall, Metals Development and the Waste Disposal Site.

Riddle still enjoys his work, even after 30 years. "Locks have remained basically the same," he says, "but some of the newer ones have magnets and chips in them



Darwin Riddle

that make them operate a little differently."

Riddle is a member of the Association of Locksmiths of America, the Iowa Locksmith Association and the Locksmith Guild.

When Riddle isn't doing locksmith work, he enjoys being with kids. For the past 23 years, he has served as a scoutmaster. He began working with Scouts when his son was young and has never stopped. "I was going to quit when my son graduated from high school in '75," Riddle says, "but some little shaver came along and I thought I'd wait until he got done and then along came another, then another, etc." He has accompanied his Scout Troops to camp for 17 years believing they get some of their best experiences and education there.

Riddle commutes to work from Pilot Mound. He has a son who lives in Grand Marais, Minnesota, a daughter in Boone and 4 grandchildren. ■

A Little Help From Their Friends

Getting a little help from their friends at Ames Laboratory in November, third grade students from Perkins Elementary School in Des Moines, Iowa learned about characteristics of various materials from graduate assistants Mitch Meyer and Simon Huss.

By making predictions about the hardness or flexibility of different materials, obtaining information through a test and observation process and coming up with a result, the students learned how to look at materials from a scientific perspective.

Perkins students were the first to participate in the Friends of Ames Laboratory outreach project. "The project is designed to excite and interest K-12 students in science and science-related careers," says Connie Hargrave, educational coordinator for Ames Laboratory.

Friends of Ames Laboratory offers the opportunity for students, teachers and Laboratory scientists to interact and develop friendships through such activities as Laboratory-sponsored school assemblies that create positive attitudes toward science, present science as a realistic and viable career option for students and illustrate the importance of science in everyday life. ■

During a Friends of Ames Lab presentation on the properties and characteristics of different materials, Meyer helps an apprehensive third grade student from Perkins Elementary School test the strength of special, heat-treated glass. Will it hold her weight?

Success—standing on a glass bridge! Can the bridge hold more weight? Hargrave prepares to join her young friend.

The finale—Huss provides a steadying hand as Hargrave and friend test glassware for two. According to Meyer, the special glass will hold up to 800 pounds.

Elena Babak, Postdoctoral Fellow (Hebert)

Jo Anne Holland, Secretary II (Noble)

Christoph Janowitz, Postdoctoral Fellow (Lynch)

Lisa Mathis, Postdoctoral Fellow (Rosenberg)

David Vaknin, Associate Physicist (Stassis)

Jing-Tai Zhao, Postdoctoral Fellow (Corbett)

Promotions

Colin Chriswell from Associate Chemist to Chemist

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